



HENK0060.ST25.txt
SEQUENCE LISTING

<110> Kottwitz, Beatrix
Breves, Roland
Maurer, Karl-Heinz

<120> DETERGENT AND CLEANING AGENT WITH HYBRID ALPHA-AMYLASES

<130> HENK-0060 / H4714

<140> US 10/774,018
<141> 2004-02-06

<150> PCT/EP02/08391
<151> 2002-07-27

<150> EP 101 38 753.9
<151> 2001-08-07

<160> 20

<170> PatentIn version 3.3

<210> 1
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<212> DNA
<213> Bacillus licheniformis

<220>
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aat gac ggc caa cat tgg aag cgc ttg caa aac gac tcg gca tat ttg 96
Asn Asp Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ser Ala Tyr Leu
20 25 30
gct gaa cac ggt att act gcc gtc tgg att ccc ccg gca tat aag gga 144
Ala Glu His Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly
35 40 45
acg agc caa gcg gat gtg ggc tac ggt gct tac gac ctt tat gat tta 192
Thr Ser Gln Ala Asp Val Gly Tyr Gly Ala Tyr Asp Leu Tyr Asp Leu
50 55 60
ggg gag ttt cat caa aaa ggg acg gtt cgg aca aag tac ggc aca aaa 240
Gly Glu Phe His Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys
65 70 75 80
gga gag ctg caa tct gcg atc aaa agt ctt cat tcc cgc gac att aac 288
Gly Glu Leu Gln Ser Ala Ile Lys Ser Leu His Ser Arg Asp Ile Asn
85 90 95
gtt tac ggg gat gtg gtc atc aac cac aaa ggc ggc gct gat gcg acc 336
Val Tyr Gly Asp Val Val Ile Asn His Lys Gly Gly Ala Asp Ala Thr
100 105 110
gaa gat gta acc gcg gtt gaa gtc gat ccc gct gac cgc aac cgc gta 384
Glu Asp Val Thr Ala Val Glu Val Asp Pro Ala Asp Arg Asn Arg Val
115 120 125
att tca gga gaa cac cga att aaa gcc tgg aca cat ttt cat ttt ccg 432
Ile Ser Gly Glu His Arg Ile Lys Ala Trp Thr His Phe His Phe Pro

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130	135	140	
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145	150	155	160
gac gga acc gat tgg gac gag tcc cga aag ctg aac cgc atc tat aag Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys			528
165	170	175	
ttt caa gga aag gct tgg gat tgg gaa gtt tcc aat gaa aac ggc aac Phe Gln Gly Lys Ala Trp Asp Trp Glu Val Ser Asn Glu Asn Gly Asn			576
180	185	190	
tat gat tat ttg atg tat gcc gac atc gat tat gac cat cct gat gtc Tyr Asp Tyr Leu Met Tyr Ala Asp Ile Asp Tyr Asp His Pro Asp Val			624
195	200	205	
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210	215	220	
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225	230	235	240
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245	250	255	
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tat ttg aac aaa aca aat ttt aat cat tca gtg ttt gac gtg ccg ctt Tyr Leu Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu			864
275	280	285	
cat tat cag ttc cat gct gca tcg aca cag gga ggc ggc tat gat atg His Tyr Gln Phe His Ala Ala Ser Thr Gln Gly Gly Tyr Asp Met			912
290	295	300	
agg aaa ttg ctg aac agt acg gtc gtt tcc aag cat ccg ttg aaa gcg Arg Lys Leu Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala			960
305	310	315	320
gtt aca ttt gtc gat aac cat gat aca cag ccg ggg caa tcg ctt gag Val Thr Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu			1008
325	330	335	
tcg act gtc caa aca tgg ttt aag ccg ctt gct tac gct ttt att ctc Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu			1056
340	345	350	
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355	360	365	
acg aaa gga gac tcc cag cgc gaa att cct gcc ttg aaa cac aaa att Thr Lys Gly Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile			1152
370	375	380	
gaa ccg atc tta aaa gcg aga aaa cag tat gcg tac gga gca cag cat Glu Pro Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His			1200
385	390	395	400
gat tat ttc gac cac cat gac att gtc ggc tgg aca agg gaa ggc gac Asp Tyr Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp			1248

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405

410

415

agc tcg gtt gca aat tca ggt ttg gcg gca tta ata aca gac gga ccc Ser Ser Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro	1296
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ggt ggg gca aag cga atg tat gtc ggc cgg caa aac gcc ggt gag aca Gly Gly Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr	1344
435 440 445	
tgg cat gac att acc gga aac cgt tcg gag ccg gtt gtc atc aat tcg Trp His Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser	1392
450 455 460	
gaa ggc tgg gga gag ttt cac gta aac ggc ggg tcg gtt tca att tat Glu Gly Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr	1440
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gtt caa aga tag Val Gln Arg	1452

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<213> *Bacillus licheniformis*

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Ala Glu His Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly	
35 40 45	

Thr Ser Gln Ala Asp Val Gly Tyr Gly Ala Tyr Asp Leu Tyr Asp Leu	
50 55 60	

Gly Glu Phe His Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys	
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Gly Glu Leu Gln Ser Ala Ile Lys Ser Leu His Ser Arg Asp Ile Asn	
85 90 95	

Val Tyr Gly Asp Val Val Ile Asn His Lys Gly Gly Ala Asp Ala Thr	
100 105 110	

Glu Asp Val Thr Ala Val Glu Val Asp Pro Ala Asp Arg Asn Arg Val	
115 120 125	

Ile Ser Gly Glu His Arg Ile Lys Ala Trp Thr His Phe His Phe Pro	
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Gly Arg Gly Ser Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe	
145 150 155 160	

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Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys
165 170 175

Phe Gln Gly Lys Ala Trp Asp Trp Glu Val Ser Asn Glu Asn Gly Asn
180 185 190

Tyr Asp Tyr Leu Met Tyr Ala Asp Ile Asp Tyr Asp His Pro Asp Val
195 200 205

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Ala Ala Glu Ile Lys Arg Trp Gly Thr Trp Tyr Ala Asn Glu Leu Gln
210 215 220

Leu Asp Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys Phe Ser Phe
225 230 235 240

Leu Arg Asp Trp Val Asn His Val Arg Glu Lys Thr Gly Lys Glu Met
245 250 255

Phe Thr Val Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn
260 265 270

Tyr Leu Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu
275 280 285

His Tyr Gln Phe His Ala Ala Ser Thr Gln Gly Gly Tyr Asp Met
290 295 300

Arg Lys Leu Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala
305 310 315 320

Val Thr Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu
325 330 335

Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu
340 345 350

Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly
355 360 365

Thr Lys Gly Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile
370 375 380

Glu Pro Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His
385 390 395 400

Asp Tyr Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp
405 410 415

Ser Ser Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro
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Gly Gly Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr
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Trp His Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser
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Val Gln Arg

<210> 3
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<220>
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 <222> (1)...(1449)

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atc gga atc act gcc gtc tgg att cct ccc gca tac aaa gga ttg agc	144
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35 40 45	
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Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu	
50 55 60	
ttc cag caa aaa ggg acg gtc aga acg aaa tac ggc aca aaa tca gag	240
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Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln Val Tyr	
85 90 95	
gga gat gtg gtt ttg aat cat aag gct ggt gct gat gca aca gaa gat	336
Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr Glu Asp	
100 105 110	
gta act gcc gtc gaa gtc aat ccg gcc aat aga aat cag gaa act tcg	384
Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu Thr Ser	
115 120 125	
gag gaa tat caa atc aaa gcg tgg acg gat ttt cgt ttt ccg ggc cgt	432
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130 135 140	
gga aac acg tac agt gat ttt aaa tgg cat tgg tat cat ttc gac gga	480
Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly	
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ggg gaa gga aaa gcg tgg gat tgg gaa gta tca agt gaa aac ggc aac Gly Glu Gly Lys Ala Trp Asp Trp Glu Val Ser Ser Glu Asn Gly Asn 180 185 190	576
tat gac tat tta atg tat gct gat gtt gac tac gac cac cct gat gtc Tyr Asp Tyr Leu Met Tyr Ala Asp Val Asp Tyr Asp His Pro Asp Val 195 200 205	624
gtg gca gag aca aaa tgg ggt atc tgg tat gcg aat gaa ctg tca Val Ala Glu Thr Lys Lys Trp Gly Ile Trp Tyr Ala Asn Glu Leu Ser 210 215 220	672
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ctg cgt gat tgg gtt cag gcg gtc aga cag gcg acg gga aaa gaa atg Leu Arg Asp Trp Val Gln Ala Val Arg Gln Ala Thr Gly Lys Glu Met 245 250 255	768
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agg cgt ttg ctg gac ggt acc gtt gtg tcc agg cat ccg gaa aag gcg Arg Arg Leu Leu Asp Gly Thr Val Val Ser Arg His Pro Glu Lys Ala 305 310 315 320	960
gtt aca ttt gtt gaa aat cat gac aca cag ccg gga cag tca ttg gaa Val Thr Phe Val Glu Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu 325 330 335	1008
tcg aca gtc caa act tgg ttt aaa ccg ctt gca tac gcc ttt att ttg Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu 340 345 350	1056
aca aga gaa tcc ggt tat cct cag gtg ttc tat ggg gat atg tac ggg Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly 355 360 365	1104
aca aaa ggg aca tcg cca aag gaa att ccc tca ctg aaa gat aat ata Thr Lys Gly Thr Ser Pro Lys Glu Ile Pro Ser Leu Lys Asp Asn Ile 370 375 380	1152
gag ccg att tta aaa gcg cgt aag gag tac gca tac ggg ccc cag cac Glu Pro Ile Leu Lys Ala Arg Lys Glu Tyr Ala Tyr Gly Pro Gln His 385 390 395 400	1200
gat tat att gac cac ccg gat gtg atc gga tgg acg agg gaa ggt gac Asp Tyr Ile Asp His Pro Asp Val Ile Gly Trp Thr Arg Glu Gly Asp 405 410 415	1248
agc tcc gcc gcc aaa tca ggt ttg gcc gct tta atc acg gac gga ccc Ser Ser Ala Ala Lys Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro 420 425 430	1296

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tgg tat gac ata acg ggc aac cgt tca gat act gta aaa atc gga tct Trp Tyr Asp Ile Thr Gly Asn Arg Ser Asp Thr Val Lys Ile Gly Ser 450 455 460	1392
gac ggc tgg gga gag ttt cat gta aac gat ggg tcc gtc tcc att tat Asp Gly Trp Gly Glu Phe His Val Asn Asp Gly Ser Val Ser Ile Tyr 465 470 475 480	1440
gtt cag aaa taa Val Gln Lys	1452

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Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Leu Ser 35 40 45
Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu 50 55 60
Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Ser Glu 65 70 75 80
Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln Val Tyr 85 90 95
Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr Glu Asp 100 105 110
Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu Thr Ser 115 120 125
Glu Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro Gly Arg 130 135 140
Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly 145 150 155 160
Ala Asp Trp Asp Glu Ser Arg Lys Ile Ser Arg Ile Phe Lys Phe Arg 165 170 175

HENK0060.ST25.txt

Gly Glu Gly Lys Ala Trp Asp Trp Glu Val Ser Ser Glu Asn Gly Asn
180 185 190

Tyr Asp Tyr Leu Met Tyr Ala Asp Val Asp Tyr Asp His Pro Asp Val
195 200 205

Val Ala Glu Thr Lys Lys Trp Gly Ile Trp Tyr Ala Asn Glu Leu Ser
210 215 220

Leu Asp Gly Phe Arg Ile Asp Ala Ala Lys His Ile Lys Phe Ser Phe
225 230 235 240

Leu Arg Asp Trp Val Gln Ala Val Arg Gln Ala Thr Gly Lys Glu Met
245 250 255

Phe Thr Val Ala Glu Tyr Trp Gln Asn Asn Ala Gly Lys Leu Glu Asn
260 265 270

Tyr Leu Asn Lys Thr Ser Phe Asn Gln Ser Val Phe Asp Val Pro Leu
275 280 285

His Phe Asn Leu Gln Ala Ala Ser Ser Gln Gly Gly Tyr Asp Met
290 295 300

Arg Arg Leu Leu Asp Gly Thr Val Val Ser Arg His Pro Glu Lys Ala
305 310 315 320

Val Thr Phe Val Glu Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu
325 330 335

Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu
340 345 350

Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly
355 360 365

Thr Lys Gly Thr Ser Pro Lys Glu Ile Pro Ser Leu Lys Asp Asn Ile
370 375 380

Glu Pro Ile Leu Lys Ala Arg Lys Glu Tyr Ala Tyr Gly Pro Gln His
385 390 395 400

Asp Tyr Ile Asp His Pro Asp Val Ile Gly Trp Thr Arg Glu Gly Asp
405 410 415

Ser Ser Ala Ala Lys Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro
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Gly Gly Ser Lys Arg Met Tyr Ala Gly Leu Lys Asn Ala Gly Glu Thr
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HENK0060.ST25.txt

Trp Tyr Asp Ile Thr Gly Asn Arg Ser Asp Thr Val Lys Ile Gly Ser
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Asp Gly Trp Gly Glu Phe His Val Asn Asp Gly Ser Val Ser Ile Tyr
 465 470 475 480

Val Gln Lys

<210> 5

<211> 1446

<212> DNA

<213> Artificial

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<223> Fusion of Alpha-Amylase-Gene von B. licheniformis and B.
 amyloliquefaciens (AL34)

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ggc cag cat tgg aaa cga ttg cag aat gat gcg gaa cat tta tcg gat	96
Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp	
20 25 30	

atc ggt att act gcc gtc tgg att ccc ccg gca tat aag gga acg agc	144
Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Thr Ser	
35 40 45	

caa gcg gat gtg ggc tac ggt gct tac gac ctt tat gat tta ggg gag	192
Gln Ala Asp Val Gly Tyr Gly Ala Tyr Asp Leu Tyr Asp Leu Gly Glu	
50 55 60	

ttt cat caa aaa ggg acg gtt cggt aca aag tac ggc aca aaa gga gag	240
Phe His Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Gly Glu	
65 70 75 80	

ctg caa tct gcg atc aaa agt ctt cat tcc cgc gac att aac gtt tac	288
Leu Gln Ser Ala Ile Lys Ser Leu His Ser Arg Asp Ile Asn Val Tyr	
85 90 95	

ggg gat gtg gtc atc aac cac aaa ggc ggc gct gat gcg acc gaa gat	336
Gly Asp Val Val Ile Asn His Lys Gly Ala Asp Ala Thr Glu Asp	
100 105 110	

gta acc gcg gtt gaa gtc gat ccc gct gac cgc aac cgc gta att tca	384
Val Thr Ala Val Glu Val Asp Pro Ala Asp Arg Asn Arg Val Ile Ser	
115 120 125	

gga gaa cac cga att aaa gcc tgg aca cat ttt cat ttt ccg ggg cgc	432
Gly Glu His Arg Ile Lys Ala Trp Thr His Phe His Phe Pro Gly Arg	
130 135 140	

ggc agc aca tac agc gat ttt aaa tgg cat tgg tac cat ttt gac gga	480
Gly Ser Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly	
145 150 155 160	

HENK0060.ST25.txt																
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Gly	Lys	Ala	Trp	Asp	Trp	Glu	Val	Ser	Asn	Glu	Asn	Gly	Asn	Tyr	Asp	
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Tyr	Leu	Met	Tyr	Ala	Asp	Ile	Asp	Tyr	Asp	His	Pro	Asp	Val	Ala	Ala	
195						200				205						
gaa	att	aag	aga	tgg	ggc	act	tgg	tat	gcc	aat	gaa	ctg	caa	ttg	gac	672
Glu	Ile	Lys	Arg	Trp	Gly	Thr	Trp	Tyr	Ala	Asn	Glu	Leu	Gln	Leu	Asp	
210						215				220						
ggt	ttc	cgt	ctt	gat	gct	gtc	aaa	cac	att	aaa	ttt	tct	ttt	ttg	cgg	720
Gly	Phe	Arg	Leu	Asp	Ala	Val	Lys	His	Ile	Lys	Phe	Ser	Phe	Leu	Arg	
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Asp	Trp	Val	Asn	His	Val	Arg	Glu	Lys	Thr	Gly	Lys	Glu	Met	Phe	Thr	
245						250							255			
gta	gct	gaa	tat	tgg	cag	aat	gac	ttg	ggc	gcf	ctg	gaa	aac	tat	ttg	816
Val	Ala	Glu	Tyr	Trp	Gln	Asn	Asp	Leu	Gly	Ala	Leu	Glu	Asn	Tyr	Leu	
260						265						270				
aac	aaa	aca	aat	ttt	aat	cat	tca	gtg	ttt	gac	gtg	ccg	ctt	cat	tat	864
Asn	Lys	Thr	Asn	Phe	Asn	His	Ser	Val	Phe	Asp	Val	Pro	Leu	His	Tyr	
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cag	ttc	cat	gct	gca	tcg	aca	cag	gga	ggc	ggc	tat	gat	atg	agg	aaa	912
Gln	Phe	His	Ala	Ala	Ser	Thr	Gln	Gly	Gly	Gly	Tyr	Asp	Met	Arg	Lys	
290						295				300						
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Phe	Val	Asp	Asn	His	Asp	Thr	Gln	Pro	Gly	Gln	Ser	Leu	Glu	Ser	Thr	
325							330						335			
gtc	caa	aca	tgg	ttt	aag	ccg	ctt	gct	tac	gct	ttt	att	ctc	aca	agg	1056
Val	Gln	Thr	Trp	Phe	Lys	Pro	Leu	Ala	Tyr	Ala	Phe	Ile	Leu	Thr	Arg	
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gaa	tct	gga	tac	cct	cag	gtt	ttc	tac	ggg	gat	atg	tac	ggg	acg	aaa	1104
Glu	Ser	Gly	Tyr	Pro	Gln	Val	Phe	Tyr	Gly	Asp	Met	Tyr	Gly	Thr	Lys	
355						360					365					
gga	gac	tcc	cag	cgc	gaa	att	cct	gcc	ttg	aaa	cac	aaa	att	gaa	ccg	1152
Gly	Asp	Ser	Gln	Arg	Glu	Ile	Pro	Ala	Leu	Lys	His	Lys	Ile	Glu	Pro	
370						375					380					
atc	tta	aaa	gcg	aga	aaa	cag	tat	gcg	tac	gga	gca	cag	cat	gat	tat	1200
Ile	Leu	Lys	Ala	Arg	Lys	Gln	Tyr	Ala	Tyr	Gly	Ala	Gln	His	Asp	Tyr	
385					390					395				400		
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Phe	Asp	His	His	Asp	Ile	Val	Gly	Trp	Thr	Arg	Glu	Gly	Asp	Ser	Ser	
405							410						415			
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Val	Ala	Asn	Ser	Gly	Leu	Ala	Ala	Leu	Ile	Thr	Asp	Gly	Pro	Gly	Gly	
420						425						430				

HENK0060.ST25.txt

gca aag cga atg tat gtc ggc cgg caa aac gcc ggt gag aca tgg cat	1344
Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr Trp His	
435 440 445	
gac att acc gga aac cgt tcg gag ccg gtt gtc atc aat tcg gaa ggc	1392
Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser Glu Gly	
450 455 460	
tgg gga gag ttt cac gta aac ggc ggg tcg gtt tca att tat gtt caa	1440
Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr Val Gln	
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aga tag	1446
Arg	

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<213> Artificial

<220>
<223> Synthetic Construct

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Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp
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Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Thr Ser
35 40 45

Gln Ala Asp Val Gly Tyr Gly Ala Tyr Asp Leu Tyr Asp Leu Gly Glu
50 55 60

Phe His Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Gly Glu
65 70 75 80

Leu Gln Ser Ala Ile Lys Ser Leu His Ser Arg Asp Ile Asn Val Tyr
85 90 95

Gly Asp Val Val Ile Asn His Lys Gly Gly Ala Asp Ala Thr Glu Asp
100 105 110

Val Thr Ala Val Glu Val Asp Pro Ala Asp Arg Asn Arg Val Ile Ser
115 120 125

Gly Glu His Arg Ile Lys Ala Trp Thr His Phe His Phe Pro Gly Arg
130 135 140

Gly Ser Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly
145 150 155 160

Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys Phe Gln
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165

170

175

Gly Lys Ala Trp Asp Trp Glu Val Ser Asn Glu Asn Gly Asn Tyr Asp
 180 185 190

Tyr Leu Met Tyr Ala Asp Ile Asp Tyr Asp His Pro Asp Val Ala Ala
 195 200 205

Glu Ile Lys Arg Trp Gly Thr Trp Tyr Ala Asn Glu Leu Gln Leu Asp
 210 215 220

Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys Phe Ser Phe Leu Arg
 225 230 235 240

Asp Trp Val Asn His Val Arg Glu Lys Thr Gly Lys Glu Met Phe Thr
 245 250 255

Val Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn Tyr Leu
 260 265 270

Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu His Tyr
 275 280 285

Gln Phe His Ala Ala Ser Thr Gln Gly Gly Tyr Asp Met Arg Lys
 290 295 300

Leu Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala Val Thr
 305 310 315 320

Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu Ser Thr
 325 330 335

Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu Thr Arg
 340 345 350

Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly Thr Lys
 355 360 365

Gly Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile Glu Pro
 370 375 380

Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His Asp Tyr
 385 390 395 400

Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp Ser Ser
 405 410 415

Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro Gly Gly
 420 425 430

Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr Trp His
 Page 12

435

440 HENK0060.ST25.txt 445

Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser Glu Gly
450 455 460

Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr Val Gln
465 470 475 480

Arg

<210> 7
<211> 1446
<212> DNA
<213> Artificial

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Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp	
20 25 30	

atc gga atc act gcc gtc tgg att cct ccc gca tac aaa gga ttg agc 144
Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Leu Ser
35 40 45

caa tcc gat aac gga tac gga cct tat gat ttg tat gat tta gga gaa 192
 Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu
 50 55 60

ttc cag caa aaa ggg acg gtc aga acg aaa tac ggc aca aaa gga gag 240
 Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Gly Glu
 65 70 75 80

ctg caa tct gcg atc aaa agt ctt cat tcc cgc gac att aac gtt tac
 Leu Gln Ser Ala Ile Lys Ser Leu His Ser Arg Asp Ile Asn Val Tyr
 85 90 95

ggg gat gtg gtc atc aac cac aaa ggc ggc gct gat gcg acc gaa gat 336
 Gly Asp Val Val Ile Asn His Lys Gly Gly Ala Asp Ala Thr Glu Asp
 100 105 110

gta acc gcg gtt gaa gtc gat ccc gct gac cgc aac cgc gta att tca	384
Val Thr Ala Val Glu Val Asp Pro Ala Asp Arg Asn Arg Val Ile Ser	
115 120 125	

gga gaa cac cga att aaa gcc tgg aca cat ttt cat ttt ccg ggg cgc 432
 Gly Glu His Arg Ile Lys Ala Trp Thr His Phe His Phe Pro Gly Arg
 130 135 140

ggc agc aca tac agc gat ttt aaa tgg cat tgg tac cat ttt gac gga 480
 Gly Ser Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly

HENK0060.ST25.txt

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165	170	175		
gga aag gct tgg gat tgg gaa gtt tcc aat gaa aac ggc aac tat gat				576
Gly Lys Ala Trp Asp Trp Glu Val Ser Asn Glu Asn Gly Asn Tyr Asp				
180	185	190		
tat ttg atg tat gcc gac atc gat tat gac cat cct gat gtc gca gca				624
Tyr Leu Met Tyr Ala Asp Ile Asp Tyr Asp His Pro Asp Val Ala Ala				
195	200	205		
gaa att aag aga tgg ggc act tgg tat gcc aat gaa ctg caa ttg gac				672
Glu Ile Lys Arg Trp Gly Thr Trp Tyr Ala Asn Glu Leu Gln Leu Asp				
210	215	220		
ggt ttc cgt ctt gat gct gtc aaa cac att aaa ttt tct ttt ttg cgg				720
Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys Phe Ser Phe Leu Arg				
225	230	235	240	
gat tgg gtt aat cat gtc agg gaa aaa acg ggg aag gaa atg ttt acg				768
Asp Trp Val Asn His Val Arg Glu Lys Thr Gly Lys Glu Met Phe Thr				
245	250	255		
gta gct gaa tat tgg cag aat gac ttg ggc gcg ctg gaa aac tat ttg				816
Val Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn Tyr Leu				
260	265	270		
aac aaa aca aat ttt aat cat tca gtg ttt gac gtg ccg ctt cat tat				864
Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu His Tyr				
275	280	285		
cag ttc cat gct gca tcg aca cag gga ggc ggc tat gat atg agg aaa				912
Gln Phe His Ala Ala Ser Thr Gln Gly Gly Gly Tyr Asp Met Arg Lys				
290	295	300		
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Leu Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala Val Thr				
305	310	315	320	
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Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu Ser Thr				
325	330	335		
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Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu Thr Arg				
340	345	350		
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Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly Thr Lys				
355	360	365		
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Gly Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile Glu Pro				
370	375	380		
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Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His Asp Tyr				
385	390	395	400	
ttc gac cac cat gac att gtc ggc tgg aca agg gaa ggc gac agc tcg				1248
Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp Ser Ser				
405	410	415		
gtt gca aat tca ggt ttg gcg gca tta ata aca gac gga ccc ggt ggg				1296
Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro Gly Gly				

HENK0060.ST25.txt

420	425	430	
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Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr Trp His			1344
435 440 445			
gac att acc gga aac cgt tc ⁴⁵⁰ gag ccg gtt gtc atc aat tcg gaa ggc			1392
Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser Glu Gly	455	460	
tgg gga gag ttt cac gta aac ggc ggg tc ⁴⁶⁵ gtt tca att tat gtt caa			1440
Trp Gly Glu Phe His Val Asn Gly Ser Val Ser Ile Tyr Val Gln	470	475	480
465 470 475 480			
aga tag			1446
Arg			

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35 40 45

Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu
50 55 60

Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Gly Glu
65 70 75 80

Leu Gln Ser Ala Ile Lys Ser Leu His Ser Arg Asp Ile Asn Val Tyr
85 90 95

Gly Asp Val Val Ile Asn His Lys Gly Gly Ala Asp Ala Thr Glu Asp
100 105 110

Val Thr Ala Val Glu Val Asp Pro Ala Asp Arg Asn Arg Val Ile Ser
115 120 125

Gly Glu His Arg Ile Lys Ala Trp Thr His Phe His Phe Pro Gly Arg
130 135 140

Gly Ser Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly
145 150 155 160

HENK0060.ST25.txt

Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys Phe Gln
165 170 175

Gly Lys Ala Trp Asp Trp Glu Val Ser Asn Glu Asn Gly Asn Tyr Asp
180 185 190

Tyr Leu Met Tyr Ala Asp Ile Asp Tyr Asp His Pro Asp Val Ala Ala
195 200 205

Glu Ile Lys Arg Trp Gly Thr Trp Tyr Ala Asn Glu Leu Gln Leu Asp
210 215 220

Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys Phe Ser Phe Leu Arg
225 230 235 240

Asp Trp Val Asn His Val Arg Glu Lys Thr Gly Lys Glu Met Phe Thr
245 250 255

Val Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn Tyr Leu
260 265 270

Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu His Tyr
275 280 285

Gln Phe His Ala Ala Ser Thr Gln Gly Gly Tyr Asp Met Arg Lys
290 295 300

Leu Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala Val Thr
305 310 315 320

Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu Ser Thr
325 330 335

Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu Thr Arg
340 345 350

Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly Thr Lys
355 360 365

Gly Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile Glu Pro
370 375 380

Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His Asp Tyr
385 390 395 400

Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp Ser Ser
405 410 415

Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro Gly Gly
420 425 430

HENK0060.ST25.txt

Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr Trp His
435 440 445

Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser Glu Gly
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Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr Val Gln
465 470 475 480

Arg

<210> 9
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<223> Fusion of Alpha-Amylase-Gene von *B. licheniformis* und *B. amyloliquefaciens* (AL112)

<220>
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<222> (1)..(1443)

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ggc cag cat tgg aaa cga ttg cag aat gat gcg gaa cat tta tcg gat
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 20 25 30 96

atc gga atc act gcc gtc tgg att cct ccc gca tac aaa gga ttg agc
Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Leu Ser
35 40 45 144

caa tcc gat aac gga tac gga cct tat gat ttg tat gat tta gga gaa 192
 Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu
 50 55 60

ttc cag caa aaa ggg acg gtc aga acg aaa tac ggc aca aaa tca gag	240
Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Ser Glu	
65 70 75 80	

cct caa gat gcg atc ggc tca ctg cat tcc cg_g aac gtc caa gta tac 288
 Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln Val Tyr
 85 90 95

gga gat gtg gtt ttg aat cat aag gct ggt gct gat gca aca gaa gat 336
 Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr Glu Asp
 100 105 110

gta acc gcg gtt gaa gtc gat ccc gct gac cgc aac cgc gta att tca 384
 Val Thr Ala Val Glu Val Asp Pro Ala Asp Arg Asn Arg Val Ile Ser
 115 120 125

gga gaa cac cga att aaa gcc tgg aca cat ttt cat ttt ccg ggg cgc 432
 Gly Glu His Arg Ile Lys Ala Trp Thr His Phe His Phe Pro Gly Arg
 130 135 140

HENK0060.ST25.txt																
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Gly	Ser	Thr	Tyr	Ser	Asp	Phe	Lys	Trp	His	Trp	Tyr	His	Phe	Asp	Gly	
145						150				155					160	
acc	gat	tgg	gac	gag	tcc	cga	aag	ctg	aac	cgc	atc	tat	aag	ttt	caa	528
Thr	Asp	Trp	Asp	Glu	Ser	Arg	Lys	Leu	Asn	Arg	Ile	Tyr	Lys	Phe	Gln	
								165			170			175		
gga	aag	gct	tgg	gat	tgg	gaa	gtt	tcc	aat	gaa	aac	ggc	aac	tat	gat	576
Gly	Lys	Ala	Trp	Asp	Trp	Glu	Val	Ser	Asn	Glu	Asn	Gly	Asn	Tyr	Asp	
								180		185			190			
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Tyr	Leu	Met	Tyr	Ala	Asp	Ile	Asp	Tyr	Asp	His	Pro	Asp	Val	Ala	Ala	
							195		200			205				
gaa	att	aag	aga	tgg	ggc	act	tgg	tat	gcc	aat	gaa	ctg	caa	ttg	gac	672
Glu	Ile	Lys	Arg	Trp	Gly	Thr	Trp	Tyr	Ala	Asn	Glu	Leu	Gln	Leu	Asp	
							210		215			220				
ggt	ttc	cgt	ctt	gat	gct	gtc	aaa	cac	att	aaa	ttt	tct	ttt	ttg	cgg	720
Gly	Phe	Arg	Leu	Asp	Ala	Val	Lys	His	Ile	Lys	Phe	Ser	Phe	Leu	Arg	
						225			230		235				240	
gat	tgg	gtt	aat	cat	gtc	agg	gaa	aaa	acg	ggg	aag	gaa	atg	ttt	acg	768
Asp	Trp	Val	Asn	His	Val	Arg	Glu	Lys	Thr	Gly	Lys	Glu	Met	Phe	Thr	
							245		250				255			
gta	gct	gaa	tat	tgg	cag	aat	gac	ttg	ggc	gcf	ctg	gaa	aac	tat	ttg	816
Val	Ala	Glu	Tyr	Trp	Gln	Asn	Asp	Leu	Gly	Ala	Leu	Glu	Asn	Tyr	Leu	
						260			265			270				
aac	aaa	aca	aat	ttt	aat	cat	tca	gtg	ttt	gac	gtg	ccg	ctt	cat	tat	864
Asn	Lys	Thr	Asn	Phe	Asn	His	Ser	Val	Phe	Asp	Val	Pro	Leu	His	Tyr	
						275			280			285				
cag	ttc	cat	qct	gca	tcg	aca	cag	gga	ggc	ggc	tat	gat	atg	agg	aaa	912
Gln	Phe	His	Ala	Ala	Ser	Thr	Gln	Gly	Gly	Gly	Tyr	Asp	Met	Arg	Lys	
						290			295			300				
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Leu	Leu	Asn	Ser	Thr	Val	Val	Ser	Lys	His	Pro	Leu	Lys	Ala	Val	Thr	
						305			310			315			320	
ttt	gtc	gat	aac	cat	gat	aca	cag	ccg	ggg	caa	tcg	ctt	gag	tcg	act	1008
Phe	Val	Asp	Asn	His	Asp	Thr	Gln	Pro	Gly	Gln	Ser	Leu	Glu	Ser	Thr	
						325			330			335				
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						340			345			350				
gaa	tct	gga	tac	cct	cag	gtt	ttc	tac	ggg	gat	atg	tac	ggg	acg	aaa	1104
Glu	Ser	Gly	Tyr	Pro	Gln	Val	Phe	Tyr	Gly	Asp	Met	Tyr	Gly	Thr	Lys	
						355			360			365				
gga	gac	tcc	cag	cgc	gaa	att	cct	gcc	ttg	aaa	cac	aaa	att	gaa	ccg	1152
Gly	Asp	Ser	Gln	Arg	Glu	Ile	Pro	Ala	Leu	Lys	His	Lys	Ile	Glu	Pro	
						370			375			380				
atc	tta	aaa	gcg	aga	aaa	cag	tat	gcf	tac	gga	gca	cag	cat	gat	tat	1200
Ile	Leu	Lys	Ala	Arg	Lys	Gln	Tyr	Ala	Tyr	Gly	Ala	Gln	His	Asp	Tyr	
						385			390			395			400	
tcc	gac	cac	cat	gac	att	gtc	ggc	tgg	aca	agg	gaa	ggc	gac	agc	tcg	1248
Phe	Asp	His	His	Asp	Ile	Val	Gly	Trp	Thr	Arg	Glu	Gly	Asp	Ser	Ser	
						405			410			415				

HENK0060.ST25.txt

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gac att acc gga aac cgt tcg gag ccg gtt gtc atc aat tcg gaa ggc Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser Glu Gly 450 455 460	1392
tgg gga gag ttt cac gta aac ggc ggg tcg gtt tca att tat gtt caa Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr Val Gln 465 470 475 480	1440
aga tag Arg	1446

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<220>
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20 25 30

Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Leu Ser
35 40 45

Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu
50 55 60

Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Ser Glu
65 70 75 80

Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln Val Tyr
85 90 95

Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr Glu Asp
100 105 110

Val Thr Ala Val Glu Val Asp Pro Ala Asp Arg Asn Arg Val Ile Ser
115 120 125

Gly Glu His Arg Ile Lys Ala Trp Thr His Phe His Phe Pro Gly Arg
130 135 140

Gly Ser Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly
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HENK0060.ST25.txt

145

150

155

160

Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys Phe Gln
 165 170 175

Gly Lys Ala Trp Asp Trp Glu Val Ser Asn Glu Asn Gly Asn Tyr Asp
 180 185 190

Tyr Leu Met Tyr Ala Asp Ile Asp Tyr Asp His Pro Asp Val Ala Ala
 195 200 205

Glu Ile Lys Arg Trp Gly Thr Trp Tyr Ala Asn Glu Leu Gln Leu Asp
 210 215 220

Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys Phe Ser Phe Leu Arg
 225 230 235 240

Asp Trp Val Asn His Val Arg Glu Lys Thr Gly Lys Glu Met Phe Thr
 245 250 255

Val Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn Tyr Leu
 260 265 270

Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu His Tyr
 275 280 285

Gln Phe His Ala Ala Ser Thr Gln Gly Gly Tyr Asp Met Arg Lys
 290 295 300

Leu Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala Val Thr
 305 310 315 320

Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu Ser Thr
 325 330 335

Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu Thr Arg
 340 345 350

Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly Thr Lys
 355 360 365

Gly Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile Glu Pro
 370 375 380

Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His Asp Tyr
 385 390 395 400

Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp Ser Ser
 405 410 415

Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro Gly Gly
 Page 20

HENK0060.ST25.txt

420

425

430

Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr Trp His
 435 440 445

Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser Glu Gly
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 465 470 475 480

Arg

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 20 25 30

atc gga atc act gcc gtc tgg att cct ccc gca tac aaa gga ttg agc 144
 Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Leu Ser
 35 40 45

caa tcc gat aac gga tac gga cct tat gat ttg tat gat tta gga gaa 192
 Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu
 50 55 60

tcc cag caa aaa ggg acg gtc aga acg aaa tac ggc aca aaa tca gag 240
 Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Ser Glu
 65 70 75 80

ctt caa gat gcg atc ggc tca ctg cat tcc cgg aac gtc caa gta tac 288
 Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln Val Tyr
 85 90 95

gga gat gtg gtt ttg aat cat aag gct ggt gct gat gca aca gaa gat 336
 Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr Glu Asp
 100 105 110

gta act gcc gtc gaa gtc aat ccg gcc aat aga aat cag gaa act tcg 384
 Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu Thr Ser
 115 120 125

gag gaa tat caa atc aaa gcg tgg acg gat ttt cgt ttt ccg ggc cgt 432
 Glu Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro Gly Arg

HENK0060.ST25.txt

130	135	140	
gga aac acg tac agt gat ttt aaa tgg cat tgg tat cat ttc gac gga Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly	150	155	480
145		160	
gcg gac tgg gat gaa tcc cg ^g aag atc agc cgc atc ttt aag ttt cgt Ala Asp Trp Asp Glu Ser Arg Lys Ile Ser Arg Ile Phe Lys Phe Arg	165	170	528
,			
g ^g gaa gga aaa g ^c g ^t gat tgg gaa gta tca agt gaa aac ggc aac Gly Glu Gly Lys Ala Trp Asp Trp Glu Val Ser Ser Glu Asn Gly Asn	180	185	576
185	190		
tat gac tat tta atg tat gct gat gtt gac tac gac cac cct gat gtc Tyr Asp Tyr Leu Met Tyr Ala Asp Val Asp Tyr Asp His Pro Asp Val	195	200	624
195	205		
gtg gca gag aca aaa aaa tgg ggt atc tgg tat g ^c aat gaa ctg tca Val Ala Glu Thr Lys Lys Trp Gly Ile Trp Tyr Ala Asn Glu Leu Ser	210	215	672
210	220		
tta gac ggc ttc cgt att gat gcc gcc aaa cat att aaa ttt tca ttt Leu Asp Gly Phe Arg Ile Asp Ala Ala Lys His Ile Lys Phe Ser Phe	225	230	720
225	235	240	
ctg cgt gat tgg gtt cag g ^c g ^t c ^g aga c ^a g ^c a ^a g ^a a ^t Leu Arg Asp Trp Val Gln Ala Val Arg Gln Ala Thr Gly Lys Glu Met	245	250	768
245	255		
ttt acg gta gct gaa tat tgg cag aat gac ttg ggc g ^c ctg gaa aac Phe Thr Val Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn	260	265	816
260	270		
tat ttg aac aaa aca aat ttt aat cat tca gtg ttt gac gtg ccg ctt Tyr Leu Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu	275	280	864
275	285		
cat tat cag ttc cat gct gca tcg aca cag gga ggc ggc tat gat atg His Tyr Gln Phe His Ala Ala Ser Thr Gln Gly Gly Tyr Asp Met	290	295	912
290	300		
agg aaa ttg ctg aac agt acg gtc gtt tcc aag cat ccg ttg aaa g ^c Arg Lys Leu Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala	305	310	960
305	315	320	
gtt aca ttt gtc gat aac cat gat aca cag ccg ggg caa tcg ctt gag Val Thr Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu	325	330	1008
325	335		
tcg act gtc caa aca tgg ttt aag ccg ctt gct tac gct ttt att ctc Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu	340	345	1056
340	350		
aca agg gaa tct gga tac cct cag gtt ttc tac ggg gat atg tac ggg Thr Arg Glu Ser G ^y Tyr Pro Gln Val Phe Tyr G ^y Asp Met Tyr G ^y	355	360	1104
355	365		
acg aaa gga gac tcc cag cgc gaa att cct gcc ttg aaa cac aaa att Thr Lys G ^y Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile	370	375	1152
370	380		
gaa ccg atc tta aaa g ^c g ^a a ^a c ^a g ^t tat g ^c tac g ^g g ^a g ^c a ^a g ^c cat Glu Pro Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr G ^y Ala Gln His	385	390	1200
385	395	400	
gat tat ttc gac cac cat gac att gtc ggc tgg aca agg gaa ggc gac Asp Tyr Phe Asp His His Asp Ile Val G ^y Trp Thr Arg Glu G ^y Asp			1248

HENK0060.ST25.txt

405	410	415	
agc tcg gtt gca aat tca ggt ttg gcg gca tta ata aca gac gga ccc Ser Ser Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro 420 425 430			1296
ggg gca aag cga atg tat gtc ggc cg ^g caa aac gcc ggt gag aca Gly Gly Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr 435 440 445			1344
tgg cat gac att acc gga aac cgt tcg gag cc ^g gtt gtc atc aat tcg Trp His Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser 450 455 460			1392
gaa ggc tgg gga gag ttt cac gta aac ggc ggg tcg gtt tca att tat Glu Gly Trp Gly Glu His Val Asn Gly Gly Ser Val Ser Ile Tyr 465 470 475 480			1440
gtt caa aga tag Val Gln Arg			1452

<210> 12
<211> 483
<212> PRT
<213> Artificial

<220>
<223> Synthetic Construct

<400> 12

Val Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Thr Pro Asn Asp
1 5 10 15

Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp
20 25 30

Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Leu Ser
35 40 45

Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu
50 55 60

Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Ser Glu
65 70 75 80

Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln Val Tyr
85 90 95

Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr Glu Asp
100 105 110

Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu Thr Ser
115 120 125

Glu Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro Gly Arg
130 135 140

HENK0060.ST25.txt

Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly
145 150 155 160

Ala Asp Trp Asp Glu Ser Arg Lys Ile Ser Arg Ile Phe Lys Phe Arg
165 170 175

Gly Glu Gly Lys Ala Trp Asp Trp Glu Val Ser Ser Glu Asn Gly Asn
180 185 190

Tyr Asp Tyr Leu Met Tyr Ala Asp Val Asp Tyr Asp His Pro Asp Val
195 200 205

Val Ala Glu Thr Lys Lys Trp Gly Ile Trp Tyr Ala Asn Glu Leu Ser
210 215 220

Leu Asp Gly Phe Arg Ile Asp Ala Ala Lys His Ile Lys Phe Ser Phe
225 230 235 240

Leu Arg Asp Trp Val Gln Ala Val Arg Gln Ala Thr Gly Lys Glu Met
245 250 255

Phe Thr Val Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn
260 265 270

Tyr Leu Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu
275 280 285

His Tyr Gln Phe His Ala Ala Ser Thr Gln Gly Gly Gly Tyr Asp Met
290 295 300

Arg Lys Leu Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala
305 310 315 320

Val Thr Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu
325 330 335

Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu
340 345 350

Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly
355 360 365

Thr Lys Gly Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile
370 375 380

Glu Pro Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His
385 390 395 400

Asp Tyr Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp
405 410 415

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Ser Ser Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro
420 425 430

Gly Gly Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr
435 440 445

Trp His Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser
450 455 . 460

Glu Gly Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr
465 470 475 480

Val Gln Arg

<210> 13
<211> 1452
<212> DNA
<213> Artificial

<220>
<223> Fusion of Alpha-Amylase-Gene von *B. licheniformis* und *B. amyloliquefaciens* (ALA34-84)

<220>
<221> CDS
<222> (1)..(1449)

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<400> 13
gta aat ggc acg ctg atg cag tat ttt gaa tgg tat acg ccg aac gac 48
Val Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Thr Pro Asn Asp
1          5           10          15

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ggc cag cat tgg aaa cga ttg cag aat gat gcg gaa cat tta tcg gat
 Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp
 20 .25 .30

atc ggt att act gcc gtc tgg att ccc ccg gca tat aag gga acg agc 144
Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Thr Ser
35 40 45

caa gcg gat gtg ggc tac ggt gct tac gac ctt tat gat tta ggg gag 192
 Gln Ala Asp Val Gly Tyr Gly Ala Tyr Asp Leu Tyr Asp Leu Gly Glu
 50 55 60

ttt cat caa aaa ggg acg gtt cg⁷⁰ gca aca aag tac ggc aca aaa gga gag
 Phe His Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Gly Glu
 65 70 75 80

ctg caa tct gcg atc ggc tca ctg cat tcc cg_g aac gtc caa gta tac
 Leu Gln Ser Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln Val Tyr
 85 90 95

gga gat gtg gtt ttg aat cat aag gct ggt gct gat gca aca gaa gat 336
 Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr Glu Asp
 100 105 110

gta act gcc gtc gaa gtc aat ccg gcc aat aga aat cag gaa act tcg	384
Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu Thr Ser	
115 120 125	

HENK0060.ST25.txt

gag gaa tat caa atc aaa gcg tgg acg gat ttt cgt ttt ccg ggc cgt Glu Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro Gly Arg 130 135 140	432
gga aac acg tac agt gat ttt aaa tgg cat tgg tat cat ttc gac gga Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly 145 150 155 160	480
gcg gac tgg gat gaa tcc cgg aag atc agc cgc atc ttt aag ttt cgt Ala Asp Trp Asp Glu Ser Arg Lys Ile Ser Arg Ile Phe Lys Phe Arg 165 170 175	528
ggg gaa gga aaa gcg tgg gat tgg gaa gta tca agt gaa aac ggc aac Gly Glu Gly Lys Ala Trp Asp Trp Glu Val Ser Ser Glu Asn Gly Asn 180 185 190	576
tat gac tat tta atg tat gct gat gtt gac tac gac cac cct gat gtc Tyr Asp Tyr Leu Met Tyr Ala Asp Val Asp Tyr Asp His Pro Asp Val 195 200 205	624
gtg gca gag aca aaa aaa tgg ggt atc tgg tat gcg aat gaa ctg tca Val Ala Glu Thr Lys Lys Trp Gly Ile Trp Tyr Ala Asn Glu Leu Ser 210 215 220	672
tta gac ggc ttc cgt att gat gcc gcc aaa cat att aaa ttt tca ttt Leu Asp Gly Phe Arg Ile Asp Ala Ala Lys His Ile Lys Phe Ser Phe 225 230 235 240	720
ctg cgt gat tgg gtt cag gcg gtc aga cag gcg acg gga aaa gaa atg Leu Arg Asp Trp Val Gln Ala Val Arg Gln Ala Thr Gly Lys Glu Met 245 250 255	768
ttt acg gtt gcg gag tat tgg cag aat aat gcc ggg aaa ctc gaa aac Phe Thr Val Ala Glu Tyr Trp Gln Asn Asn Ala Gly Lys Leu Glu Asn 260 265 270	816
tac ttg aat aaa aca agc ttt aat caa tcc gtg ttt gat gtt ccg ctt Tyr Leu Asn Lys Thr Ser Phe Asn Gln Ser Val Phe Asp Val Pro Leu 275 280 285	864
cat ttc aat tta cag gcg gct tcc tca caa gga ggc gga tat gat atg His Phe Asn Leu Gln Ala Ala Ser Ser Gln Gly Gly Tyr Asp Met 290 295 300	912
agg cgt ttg ctg gac ggt acc gtt gtg tcc agg cat ccg gaa aag gcg Arg Arg Leu Leu Asp Gly Thr Val Val Ser Arg His Pro Glu Lys Ala 305 310 315 320	960
gtt aca ttt gtt gaa aat cat gac aca cag ccg gga cag tca ttg gaa Val Thr Phe Val Glu Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu 325 330 335	1008
tcg aca gtc caa act tgg ttt aaa ccg ctt gca tac gcc ttt att ttg Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu 340 345 350	1056
aca aga gaa tcc ggt tat cct cag gtg ttc tat ggg gat atg tac ggg Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly 355 360 365	1104
aca aaa ggg aca tcg cca aag gaa att ccc tca ctg aaa gat aat ata Thr Lys Gly Thr Ser Pro Lys Glu Ile Pro Ser Leu Lys Asp Asn Ile 370 375 380	1152
gag ccg att tta aaa gcg cgt aag gag tac gca tac ggg ccc cag cac Glu Pro Ile Leu Lys Ala Arg Lys Glu Tyr Ala Tyr Gly Pro Gln His 385 390 395 400	1200

HENK0060.ST25.txt

gat tat att gac cac ccg gat gtg atc gga tgg acg agg gaa ggt gac Asp Tyr Ile Asp His Pro Asp Val Ile Gly Trp Thr Arg Glu Gly Asp 405 410 415	1248
agc tcc gcc gcc aaa tca ggt ttg gcc gct tta atc acg gac gga ccc Ser Ser Ala Ala Lys Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro 420 425 430	1296
ggc gga tca aag cgg atg tat gcc ggc ctg aaa aat gcc ggc gag aca Gly Gly Ser Lys Arg Met Tyr Ala Gly Leu Lys Asn Ala Gly Glu Thr 435 440 445	1344
tgg tat gac ata acg ggc aac cgt tca gat act gta aaa atc gga tct Trp Tyr Asp Ile Thr Gly Asn Arg Ser Asp Thr Val Lys Ile Gly Ser 450 455 460	1392
gac ggc tgg gga gag ttt cat gta aac gat ggg tcc gtc tcc att tat Asp Gly Trp Gly Glu Phe His Val Asn Asp Gly Ser Val Ser Ile Tyr 465 470 475 480	1440
gtt cag aaa taa Val Gln Lys	1452

<210> 14
<211> 483
<212> PRT
<213> Artificial

<220>
<223> Synthetic Construct

<400> 14

Val Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Thr Pro Asn Asp
1 5 10 15

Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp
20 25 30

Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Thr Ser
35 40 45

Gln Ala Asp Val Gly Tyr Gly Ala Tyr Asp Leu Tyr Asp Leu Gly Glu
50 55 60

Phe His Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Gly Glu
65 70 75 80

Leu Gln Ser Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln Val Tyr
85 90 95

Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr Glu Asp
100 105 110

Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu Thr Ser
115 120 125

Glu Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro Gly Arg
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HENK0060.ST25.txt

130

135

140

Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly
 145 150 155 160

Ala Asp Trp Asp Glu Ser Arg Lys Ile Ser Arg Ile Phe Lys Phe Arg
 165 170 175

Gly Glu Gly Lys Ala Trp Asp Trp Glu Val Ser Ser Glu Asn Gly Asn
 180 185 190

Tyr Asp Tyr Leu Met Tyr Ala Asp Val Asp Tyr Asp His Pro Asp Val
 195 200 205

Val Ala Glu Thr Lys Lys Trp Gly Ile Trp Tyr Ala Asn Glu Leu Ser
 210 215 220

Leu Asp Gly Phe Arg Ile Asp Ala Ala Lys His Ile Lys Phe Ser Phe
 225 230 235 240

Phe Arg Asp Trp Val Gln Ala Val Arg Gln Ala Thr Gly Lys Glu Met
 245 250 255

Phe Thr Val Ala Glu Tyr Trp Gln Asn Asn Ala Gly Lys Leu Glu Asn
 260 265 270

Tyr Leu Asn Lys Thr Ser Phe Asn Gln Ser Val Phe Asp Val Pro Leu
 275 280 285

His Phe Asn Leu Gln Ala Ala Ser Ser Gln Gly Gly Tyr Asp Met
 290 295 300

Arg Arg Leu Leu Asp Gly Thr Val Val Ser Arg His Pro Glu Lys Ala
 305 310 315 320

Val Thr Phe Val Glu Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu
 325 330 335

Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu
 340 345 350

Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly
 355 360 365

Thr Lys Gly Thr Ser Pro Lys Glu Ile Pro Ser Leu Lys Asp Asn Ile
 370 375 380

Glu Pro Ile Leu Lys Ala Arg Lys Glu Tyr Ala Tyr Gly Pro Gln His
 385 390 395 400

Asp Tyr Ile Asp His Pro Asp Val Ile Gly Trp Thr Arg Glu Gly Asp
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405

410

415

Ser Ser Ala Ala Lys Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro
 420 425 430

Gly Gly Ser Lys Arg Met Tyr Ala Gly Leu Lys Asn Ala Gly Glu Thr
 435 440 445

Trp Tyr Asp Ile Thr Gly Asn Arg Ser Asp Thr Val Lys Ile Gly Ser
 450 455 460

Asp Gly Trp Gly Glu Phe His Val Asn Asp Gly Ser Val Ser Ile Tyr
 465 470 475 480

Val Gln Lys

<210> 15

<211> 1458

<212> DNA

<213> Artificial

<220>

<223> Fusion of Alpha-Amylase-Gene von *B. licheniformis* and *B. amyloliquefaciens* (LAL19-433)

<220>

<221> CDS

<222> (1)..(1455)

<400> 15

gca aat ctt aat ggg acg ctg atg cag tat ttt gaa tgg tac atg ccc	48
Ala Asn Leu Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Met Pro	
1 5 10 15	

aat gac ggc cag cat tgg aaa cga ttg cag aat gat gcg gaa cat tta	96
Asn Asp Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu	
20 25 30	

tcg gat atc gga atc act gcc gtc tgg att cct ccc gca tac aaa gga	144
Ser Asp Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly	
35 40 45	

ttg agc caa tcc gat aac gga tac gga cct tat gat ttg tat gat tta	192
Leu Ser Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu	
50 55 60	

gga gaa ttc cag caa aaa ggg acg gtc aga acg aaa tac ggc aca aaa	240
Gly Glu Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys	
65 70 75 80	

tca gag ctt caa gat gcg atc ggc tca ctg cat tcc cgg aac gtc caa	288
Ser Glu Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln	
85 90 95	

gta tac gga gat gtg gtt ttg aat cat aag gct ggt gct gat gca aca	336
Val Tyr Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr	
100 105 110	

gaa gat gta act gcc gtc gaa gtc aat ccg gcc aat aga aat cag gaa	384
Glu Asp Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu	

HENK0060.ST25.txt

115	120	125	
act tcg gag gaa tat caa atc aaa gcg tgg acg gat ttt cgt ttt ccg Thr Ser Glu Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro	130 135 140		432
ggc cgt gga aac acg tac agt gat ttt aaa tgg cat tgg tat cat ttc Gly Arg Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe	145 150 155 160		480
gac gga gcg gac tgg gat gaa tcc cg aag atc agc cgc atc ttt aag Asp Gly Ala Asp Trp Asp Glu Ser Arg Lys Ile Ser Arg Ile Phe Lys	165 170 175		528
ttt cgt ggg gaa gga aaa gcg tgg gat tgg gaa gta tca agt gaa aac Phe Arg Gly Glu Gly Lys Ala Trp Asp Trp Glu Val Ser Ser Glu Asn	180 185 190		576
ggc aac tat gac tat tta atg tat gct gat gtt gac tac gac cac cct Gly Asn Tyr Asp Tyr Leu Met Tyr Ala Asp Val Asp Tyr Asp His Pro	195 200 205		624
gat gtc gtg gca gag aca aaa aca tgg ggt atc tgg tat gcg aat gaa Asp Val Val Ala Glu Thr Lys Lys Trp Gly Ile Trp Tyr Ala Asn Glu	210 215 220		672
ctg tca tta gac ggc ttc cgt att gat gcc gcc aaa cat att aaa ttt Leu Ser Leu Asp Gly Phe Arg Ile Asp Ala Ala Lys His Ile Lys Phe	225 230 235 240		720
tca ttt ctg cgt gat tgg gtt cag gcg gtc aga cag gcg acg gga aaa Ser Phe Leu Arg Asp Trp Val Gln Ala Val Arg Gln Ala Thr Gly Lys	245 250 255		768
gaa atg ttt acg gtt gcg gag tat tgg cag aat aat gcc ggg aaa ctc Glu Met Phe Thr Val Ala Glu Tyr Trp Gln Asn Asn Ala Gly Lys Leu	260 265 270		816
gaa aac tac ttg aat aaa aca agc ttt aat caa tcc gtg ttt gat gtt Glu Asn Tyr Leu Asn Lys Thr Ser Phe Asn Gln Ser Val Phe Asp Val	275 280 285		864
ccg ctt cat ttc aat tta cag gcg gct tcc tca caa gga ggc gga tat Pro Leu His Phe Asn Leu Gln Ala Ala Ser Ser Gln Gly Gly Gly Tyr	290 295 300		912
gat atg agg cgt ttg ctg gac ggt acc gtt gtg tcc agg cat ccg gaa Asp Met Arg Arg Leu Leu Asp Gly Thr Val Val Ser Arg His Pro Glu	305 310 315 320		960
aag gcg gtt aca ttt gtt gaa aat cat gac aca cag ccg gga cag tca Lys Ala Val Thr Phe Val Glu Asn His Asp Thr Gln Pro Gly Gln Ser	325 330 335		1008
ttg gaa tcg aca gtc caa act tgg ttt aaa ccg ctt gca tac gcc ttt Leu Glu Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe	340 345 350		1056
att ttg aca aga gaa tcc ggt tat cct cag gtg ttc tat ggg gat atg Ile Leu Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met	355 360 365		1104
tac ggg aca aaa ggg aca tcg cca aag gaa att ccc tca ctg aaa gat Tyr Gly Thr Lys Gly Thr Ser Pro Lys Glu Ile Pro Ser Leu Lys Asp	370 375 380		1152
aat ata gag ccg att tta aaa gcg cgt aag gag tac gca tac ggg ccc Asn Ile Glu Pro Ile Leu Lys Ala Arg Lys Glu Tyr Ala Tyr Gly Pro			1200

HENK0060_ST25.txt

385	390	395	400	
cag cac gat tat att gac cac ccg gat gtg atc gga tgg acg agg gaa				1248
Gln His Asp Tyr Ile Asp His Pro Asp Val Ile Gly Trp Thr Arg Glu				
405	410	415		
ggt gac agc tcc gcc gcc aaa tca ggt ttg gcc gct tta atc acg gac				1296
Gly Asp Ser Ser Ala Ala Lys Ser Gly Leu Ala Ala Leu Ile Thr Asp				
420	425	430		
gga ccc ggt ggg gca aag cga atg tat gtc ggc cg ^g caa aac gcc ggt				1344
Gly Pro Gly Gly Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly				
435	440	445		
gag aca tgg cat gac att acc gga aac cgt tcg gag ccg gtt gtc atc				1392
Glu Thr Trp His Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile				
450	455	460		
aat tcg gaa ggc tgg gga gag ttt cac gta aac ggc ggg tcg gtt tca				1440
Asn Ser Glu Gly Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser				
465	470	475	480	
att tat gtt caa aga tag				1458
Ile Tyr Val Gln Arg				
485				

<210> 16
<211> 485
<212> PRT
<213> Artificial

<220>
<223> Synthetic Construct

<400> 16

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1 5 10 15

Asn Asp Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu
20 25 30

Ser Asp Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly
35 40 45

Leu Ser Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu
50 55 60

Gly Glu Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys
65 70 75 80

Ser Glu Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln
85 90 95

Val Tyr Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr
100 105 110

Glu Asp Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu
115 120 125

HENK0060.ST25.txt

Thr Ser Glu Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro
130 135 140

Gly Arg Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe
145 150 155 160

Asp Gly Ala Asp Trp Asp Glu Ser Arg Lys Ile Ser Arg Ile Phe Lys
165 170 175

Phe Arg Gly Glu Gly Lys Ala Trp Asp Trp Glu Val Ser Ser Glu Asn
180 185 190

Gly Asn Tyr Asp Tyr Leu Met Tyr Ala Asp Val Asp Tyr Asp His Pro
195 200 205

Asp Val Val Ala Glu Thr Lys Lys Trp Gly Ile Trp Tyr Ala Asn Glu
210 215 220

Leu Ser Leu Asp Gly Phe Arg Ile Asp Ala Ala Lys His Ile Lys Phe
225 230 235 240

Ser Phe Leu Arg Asp Trp Val Gln Ala Val Arg Gln Ala Thr Gly Lys
245 250 255

Glu Met Phe Thr Val Ala Glu Tyr Trp Gln Asn Asn Ala Gly Lys Leu
260 265 270

Glu Asn Tyr Leu Asn Lys Thr Ser Phe Asn Gln Ser Val Phe Asp Val
275 280 285

Pro Leu His Phe Asn Leu Gln Ala Ala Ser Ser Gln Gly Gly Tyr
290 295 300

Asp Met Arg Arg Leu Leu Asp Gly Thr Val Val Ser Arg His Pro Glu
305 310 315 320

Lys Ala Val Thr Phe Val Glu Asn His Asp Thr Gln Pro Gly Gln Ser
325 330 335

Leu Glu Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe
340 345 350

Ile Leu Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met
355 360 365

Tyr Gly Thr Lys Gly Thr Ser Pro Lys Glu Ile Pro Ser Leu Lys Asp
370 375 380

Asn Ile Glu Pro Ile Leu Lys Ala Arg Lys Glu Tyr Ala Tyr Gly Pro
385 390 395 400

HENK0060.ST25.txt

Gln His Asp Tyr Ile Asp His Pro Asp Val Ile Gly Trp Thr Arg Glu
 405 410 415

Gly Asp Ser Ser Ala Ala Lys Ser Gly Leu Ala Ala Leu Ile Thr Asp
 420 425 430

Gly Pro Gly Gly Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly
 435 440 445

Glu Thr Trp His Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile
 450 455 460

Asn Ser Glu Gly Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser
 465 470 475 480

Ile Tyr Val Gln Arg
 485

<210> 17

<211> 1452

<212> DNA

<213> Artificial

<220>

<223> Fusion of Alpha-Amylase-Gene von B. licheniformis and B. amyloliquefaciens (LAL19-153)

<220>

<221> CDS

<222> (1)..(1449)

<400> 17

gca aat ctt aat ggg acg ctg atg cag tat ttt gaa tgg tac atg ccc	48
Ala Asn Leu Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Met Pro	
1 5 10 15	

aat gac ggc cag cat tgg aaa cga ttg cag aat gat gcg gaa cat tta	96
Asn Asp Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu	
20 25 30	

tcg gat atc gga atc act gcc gtc tgg att cct ccc gca tac aaa gga	144
Ser Asp Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly	
35 40 45	

ttg agc caa tcc gat aac gga tac gga cct tat gat ttg tat gat tta	192
Leu Ser Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu	
50 55 60	

gga gaa ttc cag caa aaa ggg acg gtc aga acg aaa tac ggc aca aaa	240
Gly Glu Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys	
65 70 75 80	

tca gag ctt caa gat gcg atc ggc tca ctg cat tcc cg aac gtc caa	288
Ser Glu Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln	
85 90 95	

gta tac gga gat gtg gtt ttg aat cat aag gct ggt gct gat gca aca	336
Val Tyr Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr	
100 105 110	

HENK0060.ST25.txt

gaa gat gta act gcc gtc gaa gtc aat ccg gcc aat aga aat cag gaa Glu Asp Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu 115 120 125	384
act tcg gag gaa tat caa atc aaa gcg tgg acg gat ttt cgt ttt ccg Thr Ser Glu Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro 130 135 140	432
ggc cgt gga aac acg tac agt gat ttt aaa tgg cat tgg tac cat ttt Gly Arg Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe 145 150 155 160	480
gac gga acc gat tgg gac gag tcc cga aag ctg aac cgc atc tat aag Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys 165 170 175	528
ttt caa gga aag gct tgg gat tgg gaa gtt tcc aat gaa aac ggc aac Phe Gln Gly Lys Ala Trp Asp Trp Glu Val Ser Asn Glu Asn Gly Asn 180 185 190	576
tat gat tat ttg atg tat gcc gac atc gat tat gac cat cct gat gtc Tyr Asp Tyr Leu Met Tyr Ala Asp Ile Asp Tyr Asp His Pro Asp Val 195 200 205	624
gca gca gaa att aag aga tgg ggc act tgg tat gcc aat gaa ctg caa Ala Ala Glu Ile Lys Arg Trp Gly Thr Trp Tyr Ala Asn Glu Leu Gln 210 215 220	672
ttg gac ggt ttc cgt ctt gat gct gtc aaa cac att aaa ttt tct ttt Leu Asp Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys Phe Ser Phe 225 230 235 240	720
ttg cgg gat tgg gtt aat cat gtc agg gaa aaa acg ggg aag gaa atg Leu Arg Asp Trp Val Asn His Val Arg Glu Lys Thr Gly Lys Glu Met 245 250 255	768
ttt acg gta gct gaa tat tgg cag aat gac ttg ggc gcg ctg gaa aac Phe Thr Val Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn 260 265 270	816
tat ttg aac aaa aca aat ttt aat cat tca gtg ttt gac gtg ccg ctt Tyr Leu Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu 275 280 285	864
cat tat cag ttc cat gct gca tcg aca cag gga ggc ggc tat gat atg His Tyr Gln Phe His Ala Ala Ser Thr Gln Gly Gly Tyr Asp Met 290 295 300	912
agg aaa ttg ctg aac agt acg gtc gtt tcc aag cat ccg ttg aaa gcg Arg Lys Leu Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala 305 310 315 320	960
gtt aca ttt gtc gat aac cat gat aca cag ccg ggg caa tcg ctt gag Val Thr Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu 325 330 335	1008
tcg act gtc caa aca tgg ttt aag ccg ctt gct tac gct ttt att ctc Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu 340 345 350	1056
aca agg gaa tct gga tac cct cag gtt ttc tac ggg gat atg tac ggg Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly 355 360 365	1104
acg aaa gga gac tcc cag cgc gaa att cct gcc ttg aaa cac aaa att Thr Lys Gly Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile 370 375 380	1152

HENK0060.ST25.txt

gaa ccg atc tta aaa gcg aga aaa cag tat gcg tac gga gca cag cat	1200
Glu Pro Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His	
385 390 395 400	
gat tat ttc gac cac cat gac att gtc ggc tgg aca agg gaa ggc gac	1248
Asp Tyr Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp	
405 410 415	
agc tcg gtt gca aat tca ggt ttg gcg gca tta ata aca gac gga ccc	1296
Ser Ser Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro	
420 425 430	
ggt ggg gca aag cga atg tat gtc ggc cg ^g caa aac gcc ggt gag aca	1344
Gly Gly Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr	
435 440 445	
tgg cat gac att acc gga aac cgt tcg gag ccg gtt gtc atc aat tcg	1392
Trp His Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser	
450 455 460	
gaa ggc tgg gga gag ttt cac gta aac ggc ggg tcg gtt tca att tat	1440
Glu Gly Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr	
465 470 475 480	
gtt caa aga tag	1452
Val Gln Arg	

<210> 18
<211> 483
<212> PRT
<213> Artificial

<220>
<223> Synthetic Construct

<400> 18

Ala Asn Leu Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Met Pro
1 5 10 15

Asn Asp Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu
20 25 30

Ser Asp Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly
35 40 45

Leu Ser Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu
50 55 60

Gly Glu Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys
65 70 75 80

Ser Glu Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln
85 90 95

Val Tyr Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr
100 105 110

Glu Asp Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu
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115

120 HENK0060.ST25.txt
125

Thr Ser Glu Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro
130 135 140

Gly Arg Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe
145 150 155 160

Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys
165 170 175

Phe Gln Gly Lys Ala Trp Asp Trp Glu Val Ser Asn Glu Asn Gly Asn
180 185 190

Tyr Asp Tyr Leu Met Tyr Ala Asp Ile Asp Tyr Asp His Pro Asp Val
195 200 205

Ala Ala Glu Ile Lys Arg Trp Gly Thr Trp Tyr Ala Asn Glu Leu Gln
210 215 220

Leu Asp Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys Phe Ser Phe
225 230 235 240

Leu Arg Asp Trp Val Asn His Val Arg Glu Lys Thr Gly Lys Glu Met
245 250 255

Phe Thr Val Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn
260 265 270

Tyr Leu Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu
275 280 285

His Tyr Gln Phe His Ala Ala Ser Thr Gln Gly Gly Gly Tyr Asp Met
290 295 300

Arg Lys Leu Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala
305 310 315 320

Val Thr Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu
325 330 335

Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu
340 345 350

Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly
355 360 365

Thr Lys Gly Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile
370 375 380

Glu Pro Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His
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385

390

HENK0060_ST25.txt

395

400

Asp Tyr Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp
405 410 415

Ser Ser Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro
420 425 430

Gly Gly Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr
435 440 445

Trp His Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser
450 455 460

Glu Gly Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr
465 470 475 480

Val Gln Arg

<210> 19

<211> 512

<212> PRT

<213> *Bacillus licheniformis*

<400> 19

Met Lys Gln Gln Lys Arg Leu Tyr Ala Arg Leu Leu Thr Leu Leu Phe
1 5 10 15

Ala Leu Ile Phe Leu Leu Pro His Ser Ala Ala Ala Ala Ala Asn Leu
20 25 30

Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Met Pro Asn Asp Gly
35 40 45

Gln His Trp Lys Arg Leu Gln Asn Asp Ser Ala Tyr Leu Ala Glu His
50 55 60

Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Thr Ser Gln
65 70 75 80

Ala Asp Val Gly Tyr Gly Ala Tyr Asp Leu Tyr Asp Leu Gly Glu Phe
85 90 95

His Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Gly Glu Leu
100 105 110

Gln Ser Ala Ile Lys Ser Leu His Ser Arg Asp Ile Asn Val Tyr Gly
115 120 125

Asp Val Val Ile Asn His Lys Gly Gly Ala Asp Ala Thr Glu Asp Val
130 135 140

HENK0060.ST25.txt

Thr Ala Val Glu Val Asp Pro Ala Asp Arg Asn Arg Val Ile Ser Gly
145 150 155 160

Glu His Arg Ile Lys Ala Trp Thr His Phe His Phe Pro Gly Arg Gly
165 170 175

Ser Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly Thr
180 185 190

Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys Phe Gln Gly
195 200 205

Lys Ala Trp Asp Trp Glu Val Ser Asn Glu Asn Gly Asn Tyr Asp Tyr
210 215 220

Leu Met Tyr Ala Asp Ile Asp Tyr Asp His Pro Asp Val Ala Ala Glu
225 230 235 240

Ile Lys Arg Trp Gly Thr Trp Tyr Ala Asn Glu Leu Gln Leu Asp Gly
245 250 255

Phe Arg Leu Asp Ala Val Lys His Ile Lys Phe Ser Phe Leu Arg Asp
260 265 270

Trp Val Asn His Val Arg Glu Lys Thr Gly Lys Glu Met Phe Thr Val
275 280 285

Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn Tyr Leu Asn
290 295 300

Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu His Tyr Gln
305 310 315 320

Phe His Ala Ala Ser Thr Gln Gly Gly Tyr Asp Met Arg Lys Leu
325 330 335

Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala Val Thr Phe
340 345 350

Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu Ser Thr Val
355 360 365

Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu Thr Arg Glu
370 375 380

Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly Thr Lys Gly
385 390 395 400

Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile Glu Pro Ile
405 410 415

HENK0060.ST25.txt

Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His Asp Tyr Phe
420 425 430

Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp Ser Ser Val
435 440 445

Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro Gly Gly Ala
450 455 460

Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr Trp His Asp
465 470 475 480

Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser Glu Gly Trp
485 490 495

Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr Val Gln Arg
500 505 510

<210> 20
<211> 514

<212> PRT

<213> *Bacillus amyloliquefaciens*

<400> 20

Met Ile Gln Lys Arg Lys Arg Thr Val Ser Phe Arg Leu Val Leu Met
1 5 10 15

Cys Thr Leu Leu Phe Val Ser Leu Pro Ile Thr Lys Thr Ser Ala Val
20 25 30

Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Thr Pro Asn Asp Gly
35 40 45

Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp Ile
50 55 60

Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Leu Ser Gln
65 70 75 80

Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu Phe
85 90 95

Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Ser Glu Leu
100 105 110

Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln Val Tyr Gly
115 120 125

Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr Glu Asp Val
130 135 140

HENK0060.ST25.txt

Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu Thr Ser Glu
145 150 155 160

Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro Gly Arg Gly
165 170 175

Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly Ala
180 185 190

Asp Trp Asp Glu Ser Arg Lys Ile Ser Arg Ile Phe Lys Phe Arg Gly
195 200 205

Glu Gly Lys Ala Trp Asp Trp Glu Val Ser Ser Glu Asn Gly Asn Tyr
210 215 220

Asp Tyr Leu Met Tyr Ala Asp Val Asp Tyr Asp His Pro Asp Val Val
225 230 235 240

Ala Glu Thr Lys Lys Trp Gly Ile Trp Tyr Ala Asn Glu Leu Ser Leu
245 250 255

Asp Gly Phe Arg Ile Asp Ala Ala Lys His Ile Lys Phe Ser Phe Leu
260 265 270

Arg Asp Trp Val Gln Ala Val Arg Gln Ala Thr Gly Lys Glu Met Phe
275 280 285

Thr Val Ala Glu Tyr Trp Gln Asn Asn Ala Gly Lys Leu Glu Asn Tyr
290 295 300

Leu Asn Lys Thr Ser Phe Asn Gln Ser Val Phe Asp Val Pro Leu His
305 310 315 320

Phe Asn Leu Gln Ala Ala Ser Ser Gln Gly Gly Tyr Asp Met Arg
325 330 335

Arg Leu Leu Asp Gly Thr Val Val Ser Arg His Pro Glu Lys Ala Val
340 345 350

Thr Phe Val Glu Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu Ser
355 360 365

Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu Thr
370 375 380

Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly Thr
385 390 395 400

Lys Gly Thr Ser Pro Lys Glu Ile Pro Ser Leu Lys Asp Asn Ile Glu
405 410 415

HENK0060.ST25.txt

Pro Ile Leu Lys Ala Arg Lys Glu Tyr Ala Tyr Gly Pro Gln His Asp
420 425 430

Tyr Ile Asp His Pro Asp Val Ile Gly Trp Thr Arg Glu Gly Asp Ser
435 440 445

Ser Ala Ala Lys Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro Gly
450 455 460

Gly Ser Lys Arg Met Tyr Ala Gly Leu Lys Asn Ala Gly Glu Thr Trp
465 470 475 480

Tyr Asp Ile Thr Gly Asn Arg Ser Asp Thr Val Lys Ile Gly Ser Asp
485 490 495

Gly Trp Gly Glu Phe His Val Asn Asp Gly Ser Val Ser Ile Tyr Val
500 505 510

Gln Lys